Site Location of Development
TECHNICAL REVIEW MEMORANDUM
Bureau of Land and Water Quality
TO: **Erle Townsend, Project Manager**
FROM: **David A. Waddell -- Division of Watershed Management**
DATE: **April 12, 2012**
RE: **Canton – Canton Mtn. Wind Power**

APPLICANT: Canton Mountain Wind LLC
DEP#: L-25557-24-A-N
Town: Canton
Engineer who prepared application: Engineering and Management Inc., Glauber deJesus, Bob Cummings
Parcel Size: 33.4 acres of disturbed land (Most of this area will be revegetated or is being rehabilitated)
Site Description: The project area is wooded and used as commercial timber land. Adjacent properties are generally undeveloped and used primarily for commercial timber harvesting operations, like the project site. This site is not located in the direct watershed of an Urban Impaired Stream listed in Chapter 502, Appendix B. The project area drains to Ridley Brook and Ludden Brook, which both drain to the Androscoggin River, and parts of the project area also drain directly to the Androscoggin River. Eventually, the Androscoggin River flows into the Atlantic Ocean.

Project description: The Canton Mountain Wind Project (Project) is an eight-turbine, 22-megawatt (MW) wind energy generation project located in the municipality of Canton, Oxford County, Maine. The Project includes approximately 7,175 linear feet of gravel road improvement and temporary widening on Ludden Lane; 8,600 linear feet improvement and temporary widening on a private, unnamed logging road; and approximately 10,600 linear feet of new roads, including (i) a 3,425-foot-long access road to the ridgeline, (ii) an approximately 7,175-linear-foot ridgeline road that will connect the wind turbine tower foundations, and (iii) a 360-foot-long access road to the operations and maintenance (O&M) building. Along the ridgeline road, eight wind turbines and associated electrical collection infrastructure will be installed. The Project also includes a 3,500-square-foot O&M building, and an approximately 7,500-square-foot parking lot. All new impervious areas will be treated pursuant to the Maine Stormwater Management Law (38 M.R.S.A. § 420 et al. and Chapter 500 Rules). When construction of the Project is complete, the total impervious area will be 4.6 acres, and the total developed area will be 5.3 acres.

Size of new impervious area: 4.6 acres
Size of new developed area: 5.3 acres
Watershed (waterbody): Ludden and Ridley Brook, Tributaries to the Androscoggin River
Watershed type: other

PLANS USED FOR REVIEW:
Watershed Plans: Figure 12-1, "Watershed Areas," dated 12/11 no revisions.
Water Quality Treatment: Plan Sheets C-300-33 through C-309-33, "Plan and Profile," dated 12/15/11 no revisions.
Erosion and Sediment Control Plans: Plan Sheets C-200-33 through C-213-33, "Plan and Profile," dated 12/15/11 no revisions.
Note: Other plans may have been reviewed that are not noted here.

STORMWATER MANAGEMENT
The applicant is proposing an industrial scale wind project capable of generating 22 megawatts of power from 8 turbine locations. This project lies within the watershed of tributaries to the Androscoggin River. Though encumbering 33.4 acres of land, the proposed project will create 5.3 acres of developed area and 4.6 acres of impervious area. As such the project triggers the Site

Location of Development Act and must address the impacts under the "Stormwater Law'". This project must meet the Basic, General, and Flooding Standards. This project is being reviewed under the 2006 Stormwater Management rules and the design and sizing of the proposed BMPs for this project are based on the "Stormwater Management for Maine" January 2006.

Stormwater quality treatment and flooding mitigation will be achieved with numerous buffers and a grassed underdrained soil filter.

BASIC STANDARDS:
Note: *As always the applicant's erosion control plan is a good starting point for providing protection during construction. However, based on site and weather conditions during construction, additional erosion and sediment control measures may necessary to stop soil from leaving the site. In addition, other measures may be necessary for winter construction. All areas of instability and erosion must be repaired immediately during construction and need to be maintained until the site is fully stabilized or vegetation is established. Approval of this plan does not authorize discharges from the site.*

1. C-510-33 Erosion Control Notes: The erosion control notes refer to silt fencing when there is not detail for silt fencing. Best to change this to the more generic "sediment barrier". Thus it refers to all sediment barriers whether they are geosynthetic berms or erosion control mix berms. Please address.

Silt fencing has been replaced by sediment barrier.

Approval recommended for this section.

GENERAL STANDARDS

2. Section 21.11 of the stormwater narrative dealing with water quality states that no phosphorous analysis is necessary since the project does not impact any lake watersheds. Though this is true, the General Standards still need to be addressed. Please include the General Standard totals in the narrative.

Section 12 has been modified to include an explanation of how the project is dealing with water quality issues.

3. Plan sheet C-601-33 shows totals for the roads and turbines. The totals for road segment and turbine impervious areas only totals to 4.597 acres which is less than the 9.00 acres of impervious area stated in the narrative for the project. Of the 4.597 acres of impervious area 77.4 % is treated with BMPs. It should be stated that there is no developed area in this section of the project and as such the developed area and the impervious area are the same and treated the same which is greater than the required 50%. The O+M building needs to meet the nonlinear treatment standard of 95% of the impervious area treated and 80% of the developed area treated. This area was not assessed separately and needs to be included in the narrative. Addressing this section will minimally change the stated percentages.

The totals were revised. The total impervious area is 4.597 acres. The impervious surface from the improvement to Ludden lane and the Logging Road were mistakenly included in the calculations.

The O&M building pad impervious surface is being treated 100% through and underdrained soil filter See table on sheet C-601-33

4. C-601-33, Treatment tables must show the actual average slope with in the buffer area.

Slopes within the buffer area were averaged.

5. I am concerned that buffer slopes within this project are bordering on the edge of buffer use and treatment may need to be rethought or discussed for this project and possibly future projects. Many

things are with in the department's discretion but I may need others to comment on the validity of the direction we are going.

For now, I should outline the current thought on buffer use for these kinds of projects. Chapter 500 rules for road side buffer slopes for standard BMPs extend to a 20%. All other buffers have a 15% slope limit. We have agreed that the state of healthy buffers on most of these projects and the desire to stay away from structural BMPs we would allow these road side buffers to be extended to 24%. For slopes greater than 24% we discussed that if the down gradient side of the road was revegetated after construction, the 16' of low slope revegetated-road would balance out the 20' of steeper slope of the forested areas below. For these buffer's, a berm of erosion control mix would be used to facilitate the distribution of flows into sheet flow. This process would allow for the extension buffer slopes to 30%.

For buffers steeper than 30%, a berm of "stone bermed level spreader" stone would be used to ensure that flows were detained to maximize infiltration and redistribute flow into a sheet flow component. Depending on the steepness, multiple berms might be necessary. These buffers were to be applied as a last resort and on limited areas. Linear projects already are allowed to meet a reduced standard of treatment. Only 75% of the impervious area needs to be treated. This would allow for the steepest of slopes be passed over for treatment. For this project 45% of the buffers are greater that 24% and require a modified standard, and 15% of the slopes are into the 30% or greater range. This is after the reduced standard.

Please re-look at the proposed treatment train and consider treatment of sections within other types of buffers like ditch turnout buffers. Also consider maximizing the credit opportunities that exist on site. Any portion of the project where existing impervious area is being covered over with new impervious area may be applicable for credit. Roads that are being cut off or eliminated and can be revegetated may also be applicable for credit. Barring solutions like this, we may have to resort to more structural measures to meet project goals.

The revegetated portion of the proposed roads was revised to be in the down gradient side of the road. Forcing the runoff from the impervious section of the road to go the artificial meadow buffer The length of the flow path varies depending on the slope of the road; this length determines the size of the buffer through the revegetated area. After the runoff has gone through the first stage of treatment it then goes through a 35' forested buffer. The slope on the BF varies according to the existing topology. The slope for the BM-BF buffer is determined based on the average slope of the flow path through the revegetated area and the forested buffer.

All buffers with slope steeper than 20% were removed.

6. C-509-33 details the revegetated sections of road. As intended, the design is for the down gradient side of the road to be revegetated. Series C-300 drawings seem to only revegetate the uphill side of the road. Though applicable for roadside buffers less than 24% in slope, for the buffers to work the down gradient side will need to be treated for buffers that are steeper than 24%.

See response to comment 5.

7. Road side buffer treatment below level spreaders providing cross drainage relief would be saturated and provide little long term treatment. In example LS-04 discharges above BF2 and would impact the long term effectiveness of that road side buffer. Please provide treatment at other locations.

Buffer is removed.

8. C-601-33, BMP Sizing Schedule, This table outlines the lengths for ditch turnouts and level spreaders. These sizing designations and labels may be confusing due to mostly nomenclature. In the department standards the all ditch turnouts are a minimum of 20 feet in length. If these structures are intended to be sized then they are probably level spreaders, if not please up the sizing. The difference in size relates to the material that the berm structure is made of.

Table is revised. Level spreaders have been sized accordingly, and ditch turnouts have been placed where needed.

9. Many new culverts proposed along the Access road, Lower Ridge Road and Upper Ridge Road do not have level spreaders shown but reference C-503-33 or C-504-33. Both of these details indicate either level spreaders or ditch turnouts. From this I would assume that all culverts have one or the other. Is this correct? The lengths when applying Chapter 500, section 5 (A) "Management of stormwater discharges," would be significantly longer than the lengths indicated (LS-04 would be closer to 175' which would be too long). How were the lengths determined? Chapter 500, section 5 (A) calls for minimum sizing and lengths for discharges. Though the appropriate level spreader sizing will result in exceeding the 25' maximum (within reason), the information does indicate that more frequent cross culverts should be considered to reduce runoff flow to a more manageable size and erosive stability.

Level spreaders have been sized accordingly. Most culvert outlets will have plunge pools see detail C-507-33.

10. C-304-33, For culverts like PC-06 and PC-10 that drain to defined channels that may not qualify as streams, is the intent to still use level spreaders?

Culverts are now placed with the intent to follow the existing path of the streams. Plunge pools will be added at the pipe outlets if they land beyond the rock banks.

11. For culverts like PC-06, PC-0, and PC-12, does it make sense to put in level spreaders? Would plunge pools with aprons be enough to redistribute water to sheet flow?

Plunge pools will be added at the pipe outlets if they land beyond the rock banks.

12. C-503-33 and C-504-33, These details show the level spreaders as concave. This is the worst case for level spreaders and should never be used in these situations since the flow will concentrate much more quickly. The actual location of the proposed level spreaders appears to be okay, but a contractor might interpret this as desirable when it isn't.

Detail is revised.

13. C-601-33 Underdrained Soil filter Sizing Calculations, shown the Volume required as 1259 cf the volume provided 2348 **sf** (?) and the Area provided as 942 sf, which is less that the surface elevations used in the calculations of volume. Please address.

Table is revised. There was a problem with the excel formula.

14. C-512-33, Soil Filter Notes: Note 2 needs to include that the resulting mix of soil and organic material have a total of less than 2% clay content.

Soil filter note has been revised to include comment above.

15. Conflicts with the existing road infrastructure appear to be a constant with these types of proposed projects. The existing configuration of roads is cut off by the proposed road system. Plans show ditches through roads and extensive road fills that discontinue roads. At a minimum, these roads if not discontinued should be planned for with appropriate engineering and grading. Please correct.

Portion of the existing roads will be scarified and revegetated.

Specific Comments:

16. C-301-33, Sta 88+27, Does the proposed road cover over the existing road? Is this portion of road being discontinued? If so, scarifying and re-vegetating the road would gain some credit toward your impervious totals.

See response to comment 15.

17. C-301-33, Sta 88+27 to 90+20, Is the proposed ditch line along the left side of the road necessary? Adjust grading?

Modeling issues are resolved.

18. C-304-33, Sta 8+60, PC-10, A channel is shown relatively close to this culvert. Is the intent to connect to this channel? If so the location should be checked to see that they coincide.

Culvert is now placed with the intent to follow the existing path of the streams. Plunge pool will be added at the pipe outlets if they land beyond the rock bank.

19. C-305-33, BF21, this buffer is truncated by existing road at Sta 15+40. Please adjust.

See response to comment 15.

20. C-305-33, PC11, This culvert has a 5.17 acre drainage area. Though a level spreader is necessary in this area it appears to conflict with the necessary sizing and existing road configuration.

See response to comment 15.

21. C-305-33, Sta 15+50, existing road conflicts.

See response to comment 15.

22. C-305-33, BF22, Road ditch above buffer diverts flow away. Effective portion of road treatment from sta 17+10 to 18+00.

Modeling issues are resolved.

23. C-307-33, BF32, the proposed slope in BF32 does not appear to be averaged. Some portions are much shallower.

Buffer slopes are averaged accordingly.

24. C-308-33, Sta 25+50 to 28+38 which is currently untreated could be diverted into a level spreader buffer along contour 1490.

Ditch turnout has been added and will include buffer if necessary.

25. C-308-33, Sta 31+25 to 34+60 could be taken to BF43 with a level spreader along contour 1480.

Extended buffer so it would get the flow from the ditch turnout

26. C-308-33, BF34, This buffer concentrates flow and provides little treatment. Consider extending BF35 or using a ditch turn out to a buffer.

Relocated buffer 34 to a more suitable location.

27. C-308-33, BF35, Sta 36+30 to 39+25 goes to BF35.

There was an issue with excell table that has been revised.

28. C-309-33, BF35, Extend BF35 from sta 41+15 to 43+35. Adjust proposed road contour 1492 to accommodate.

Road pitches to the opposite side. Added buffer 37A instead.

29. C401-33,O+M Bluilding access road, Sta 1+75 to 3+61 could be treated in a road side buffer between roads. You could potentially collect the rest of the runoff and treat it in a LS on the other side of the road.

Added ditch tunout buffer to treat portion of road.

30. C-402-33 and C-403-33, Be sure that the ditching goes to the ditch turnouts specified. Could show flow arrows to help contractors installation. (Example T01, T03,) Turbine roads going to level spreaders for treatment should show the treatment buffer below the ditch turnout. See Chapter 500 for sizing.

Flow arrows have been added to show flow direction.

31. Turbine pad buffers seem to be offset from the flow lines from the turbine pads on most of the Turbine locations.

They were designed this way so only the runoff from the impervious areas will be treated.

FLOODING STANDARDS
Linear projects create relatively little impervious area in any one sub-watershed and as such the applicant has looked at the impact on the wider watershed area. By looking at the impact on just the watershed's curve number (the first step in the typical TR20 or TR55 analysis) we can see the relative change in the watershed by flooding. This is also acceptable since the goal of the applicant has been to turn out or buffer as much of the road impacts as possible. This creates a large amount of disconnected impervious area, keeps flows from exiting the site in concentrated flow, and lengthens the flow path in a manner that will mitigate for local flooding impacts. The applicant has provided an analysis of the watersheds involved in this project for flooding. For this project the applicant has provided an analysis of the individual watershed and the percent of new impervious area compared to the watershed as a whole. This directly impacts the curve number of the watershed in a direct correlation. The analysis shows changes in the order of 0.02% or 1/100th of the curve number. This is well within model tolerances. Approval recommended for this section.

MAINTENANCE:
NOTE: The applicant and contractor will be responsible for the maintenance of all proposed stormwater management structures, i.e. ponds, swales, culverts and discharge outlets during construction. Thereafter, each stormwater management structure should be cleaned and cleared of debris yearly at a minimum. Sweeping of all pavements is recommended on an annual basis. The DEP may request to inspect the site at a future date.

For this project, Canton Mountain Wind LLC / Andy Novey (857) 403-0119, shall be responsible for the long-term inspection and maintenance of the stormwater management system according to the plan provided by the applicant. Approval recommended for this section.

DESIGN REVIEW RESPONSIBILITY
This review only ensures that the proposed plan is meeting the minimum standards set by the department for erosion control management and for stormwater management. It does not guarantee that the design is appropriate for the level of work suggested and for the functionality of the facility.